

# Prosthetic Bioabsorbable Mesh for Hiatal Hernia Repair During Sleeve Gastrectomy

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## ABSTRACT

**Background and Objectives:** Laparoscopic sleeve gastrectomy has become a valuable primary bariatric operation. It has an acceptable complication profile and amount of weight loss. However, one of the most distressing complications to the patient is reflux postoperatively. There is thought to be a relationship between a hiatal hernia and postoperative reflux. There is disagreement on how to address a hiatal hernia intraoperatively, and the use of mesh is controversial. Our objectives were to examine the use of a prosthetic bioabsorbable mesh for repair of a large hiatal hernia during a sleeve gastrectomy and to examine the incidence of reflux and mesh-related complications in the near term.

**Methods:** This is a case series of patients with hiatal hernia undergoing a primary sleeve gastrectomy. None of the patients had a previous hiatal hernia repair. Three patients with large hiatal hernias diagnosed preoperatively or intraoperatively were included. The hiatus of the diaphragm was repaired with a posterior crural closure, and a piece of prosthetic bioabsorbable mesh was placed posteriorly to reinforce the repair.

**Results:** There were 3 patients. The mean follow-up period was 12 months. There were no mesh-related complications. One of the patients needed to resume proton pump inhibitors to control reflux.

**Conclusion:** The use of a prosthetic bioabsorbable mesh to repair a hiatal hernia simultaneously with a sleeve gastrectomy is safe. There were no mesh-related complications at 1 year.

**Key Words:** Sleeve gastrectomy, Mesh, Hiatal hernia, Postoperative complications.

## INTRODUCTION

The laparoscopic sleeve gastrectomy (SG) has become a standard bariatric surgical procedure. The indications for the operation are the same as those for a Roux-en-Y gastric bypass. Contraindications are being elucidated and are not agreed on by everyone. An absolute contraindication is the inability to tolerate general anesthesia, whereas relative contraindications include age, Barrett esophagus, tobacco use, and the presence of gastroesophageal reflux disease (GERD) with or without hiatal hernia (HH). The relationship of GERD and morbid obesity is well established, and up to 50% of morbidly obese patients complain of GERD. This is thought to be from increased intra-abdominal pressure and anatomic abnormalities such as HH.<sup>1</sup> This leads some surgeons to believe that GERD will be worsened by an SG, although the Roux-en-Y gastric bypass is an accepted treatment for GERD in the morbidly obese patient. There are conflicting results regarding GERD after SG, with some authors reporting a 7.8% to 20% increase in symptoms. Howard et al.<sup>2</sup> reported new onset of GERD symptoms after SG in 18% of patients. The results from the Third International Summit for Sleeve Gastrectomy found that GERD developed postoperatively in 17% of patients.<sup>3</sup> However, Himpens et al.<sup>4</sup> showed that 75% of patients had decreased symptoms, but at 1 year of follow-up, GERD had developed in 22% of patients without preoperative symptoms. In light of these conflicting reports, most surgeons will elect to repair an HH if one is detected intraoperatively.

Both closure of the hiatus primarily and treatment with a mesh have been shown to yield good results with low recurrence of GERD after SG.<sup>4</sup> There are a small number of case series available on the use of biological mesh placed at the same time as SG. No data have been reported on the use of a prosthetic bioabsorbable mesh. We report on the use of a bioabsorbable prosthetic mesh—a copolymer of polyglycolic acid–trimethylene carbonate (GORE BIO-A; W. L. Gore & Associates, Newark, NJ,

Providence Memorial Bariatric Center, Providence Memorial Hospital, El Paso, TX, USA.

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USA)—placed after posterior crural closure for reinforcement during the SG.

## METHODS

Three patients underwent laparoscopic SG for weight loss. They were all women, with a mean age of 53 years. All patients gave informed consent to use their de-identified data for the study.

### Case 1

The first patient was a 64-year-old woman with a body mass index (BMI) of 40 kg/m<sup>2</sup>. She had a 6-cm HH defect measured transversely. She underwent a laparoscopic SG with a 34F bougie to size the vertical resection. Staple line reinforcement was used with Gore Seamguard (W. L. Gore & Associates), and intraoperative endoscopy was performed at the conclusion of the operation. A complete dissection of the gastroesophageal junction was performed with a primary posterior repair of the crura with No. 2-0 Ethibond figure-of-8 sutures (Ethicon, Somerville, NJ, USA). A shaped prosthetic bioabsorbable mesh (GORE BIO-A) was secured to the diaphragm with absorbable suture (**Figure 1**). The patient had an uncomplicated course and subsequently lost 22.6 kg at 7 months' follow-up. Her primary care physician instructed her to begin taking proton pump inhibitors at 7 months for de novo symptoms of GERD.

### Case 2

The second patient was a 56-year-old woman with a BMI of 36 kg/m<sup>2</sup>. She had an HH defect that measured 6 cm



**Figure 1.** BIO-A mesh.

transversely. She also underwent a laparoscopic SG with mesh as previously described for the first patient. Her postoperative course was complicated by a pulmonary embolus requiring readmission and intensive care unit stay. The patient subsequently underwent oral anticoagulation therapy and was found to have a hypercoagulability disorder. At 12 months' follow-up, she had lost 32 kg. She had no symptoms of GERD.

### Case 3

The third patient was a 45-year-old woman with a BMI of 59.2 kg/m<sup>2</sup>. She had an HH defect of 5 cm transversely. She underwent SG with mesh placement as previously described. She had an uneventful postoperative course. She lost 57.1 kg at 17 months' follow-up. She had no symptoms of GERD postoperatively.

## RESULTS

The mean follow-up period was 12 months, with symptoms of GERD developing in one patient. None of the patients had any mesh-related complications. The mean weight loss was 37.2 kg.

## DISCUSSION

Data regarding prosthetic bioabsorbable mesh use during SG are lacking. This study is the first published study regarding the use of this mesh during primary SG. Most bariatric surgeons agree on the need to perform an HH repair if HH is detected during SG, and the methods to perform the repair are debated. The surgeon can elect to perform an anterior repair, a posterior repair, or a formal cruroplasty with mesh reinforcement. Daes et al.<sup>1</sup> studied 134 patients undergoing an SG. GERD had been diagnosed preoperatively in 49% of patients. Of the 134 patients, 25% had HH diagnosed intraoperatively. Three of these patients had the HH reduced, 28 had an anterior repair, and 3 had a posterior repair. Of these patients, 1.5% had GERD postoperatively. Mesh was not used in any of these patients, and these results show a very low rate of symptomatic GERD if the hiatus is repaired.

The first report of using mesh to repair an HH during SG was by Korwar et al.<sup>5</sup> They reported a single patient who underwent an SG with a simultaneous repair of an HH by posterior crural closure with 3 interrupted sutures of No. 2-0 Ethibond. The repair was reinforced with a biological mesh (Surgisis; Cook Biotech, West Lafayette, IN) stapled to the diaphragm. The GERD symptoms resolved, and there were no complications from placing a biological

mesh. Soricelli et al.<sup>6</sup> reported on 6 patients with HH repaired during an SG. They used nonabsorbable suture repair of the crura in 4 patients, but 2 patients needed prosthetic mesh reinforcement because the HH measured >5 cm. The authors used polypropylene mesh stapled to the diaphragm. There were no mesh complications or recurrences of GERD.

The use of mesh at the hiatus has been debated for years. There is a large body of literature that has examined the use of mesh for the repair of paraesophageal hernias. Mesh has been associated with multiple complications, including stricture, dysphagia, and erosion into the esophagus. There are isolated case reports as well as small series examining the rate of mesh erosion. The largest series comprised 28 patients gathered from a review of the literature.<sup>7</sup> This was a collection of adverse events, not total cases; therefore the incidence of mesh erosion was not studied. Seventeen of the 28 patients had mesh erosion, and 7 patients required esophagectomy. Another study, by Frantzides et al.,<sup>8</sup> tried to examine the incidence of mesh erosion. A survey of members of the Society of American Gastrointestinal and Endoscopic Surgeons who perform HH repair was taken. There were a total of 5486 HH repairs with mesh reported (77% performed laparoscopically). The mesh erosion rate was 0.3%. Despite the obvious limitations of self-reporting, this is a valuable attempt to determine the true incidence of mesh complications. In response to the rare but serious complications, alternative meshes such as biological, or tissue, meshes have been created to address these problems. The use of these meshes has reduced the erosion rate, but recurrence continues to be a problem.<sup>9</sup>

In the quest for a more perfect mesh, a prosthetic, completely bioabsorbable mesh was manufactured in 2006. A copolymer of polyglycolic acid–trimethylene carbonate (BIO-A) was specifically designed to be fully absorbed after 6 months by hydrolysis. It is 67% polyglycolic acid and 33% trimethylene carbonate. It is replaced on a 1:1 basis with the patient's type I collagen.<sup>10</sup> This is the same polymer as Maxon (Covidien, Norfolk, Connecticut) suture and also the same as the Gore Seamguard product. Both products have a long history of safety. BIO-A has been used in the hiatus for repair of paraesophageal hernias.<sup>11</sup> According to our literature search, this case series presents the first reported patients treated with BIO-A mesh for HH repair during SG.

There was 1 larger series using this bioabsorbable mesh during gastrectomy published in the literature, but the authors described a longitudinal gastrectomy with simultane-

ous HH repair with BIO-A performed in obese and morbidly obese patients expressly for the repair of symptomatic paraesophageal hernias.<sup>12</sup> Nineteen patients were studied, with a mean preoperative BMI of 37.8 kg/m<sup>2</sup>. Mesh was used to reinforce the hiatus in 15 of 19 cases. In 10 cases the mesh was an acellular porcine dermis, and in 5 cases it was a composite bioabsorbable mesh (BIO-A). This study was designed to test the resolution of GERD symptoms, and the rate of use of daily antisecretory medications decreased from 94.7% to 58.8%. The technique is a slightly modified SG, not performed expressly for weight loss. Although an exact extrapolation of the authors' results to SG is not possible, the resolution of GERD symptoms and lack of complications from the use of a bioabsorbable mesh do seem to be reproducible. Silecchia<sup>13</sup> presented an abstract at the 2012 meeting of the International Federation for the Surgery of Obesity and Metabolic Disorders with 7 SG patients. Three patients had intense GERD, and 4 had weight regain. The patients underwent a fundectomy (resleeve) and crural closure. BIO-A was used as a mesh reinforcement. Silecchia found that there was no recurrence at 3 months, and the use of proton pump inhibitors was discontinued. Another abstract was recently presented from England with the case report of a patient who had a resleeve with simultaneous HH with the same bioabsorbable mesh as used in our series.<sup>14</sup> It was presented at the International Federation for the Surgery of Obesity and Metabolic Disorders, European Chapter, meeting in Barcelona, Spain. There are no cases reported in the literature with a mesh repair of the hiatus at the time of a primary SG. This lack of data can only be corrected if all surgeons share their results in the literature. We also will not know the effectiveness or complication rates of these new meshes if we do not publish our results for critical review. Although long-term data are needed, there does not seem to be the same risk of mesh erosion found with prosthetic meshes used at the hiatus.

## CONCLUSION

The use of a prosthetic bioabsorbable mesh placed at the time of SG is safe. There were no mesh-related complications at 1 year.

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